ENGINEER MANUAL for CIVIL WORKS
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WIRE ROPE SELECTION CRITERIA for GATE OPERATING DEVICES

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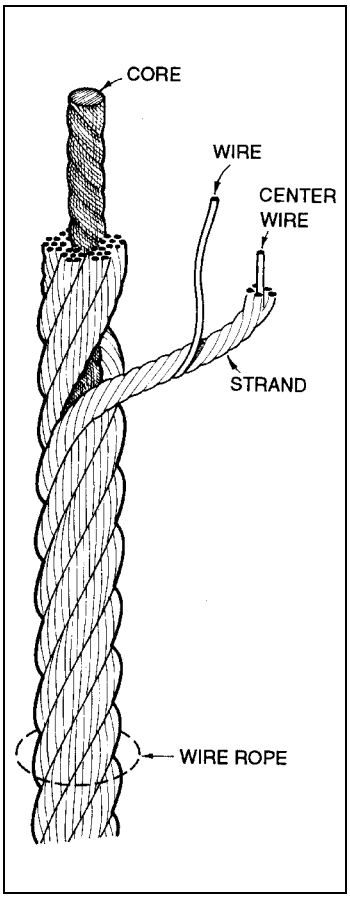
INTRODUCTION This new engineer manual will provide information and criteria for selection of new or replacement wire rope, specifically for Corps of Engineers civil works gate operating devices. In addition it covers wire rope terminations, field acceptance, maintenance, and inspection. Its purpose is to optimize the service life of wire rope, and to reduce the likelihood of unscheduled or unanticipated failures.



PROBLEM Unanticipated wire rope failures at a number of projects prompted the development of this manual. Such failures typically render gates inoperable causing delays to navigation and flooding.

Note, that any wire rope, if not eventually replaced, will fail. The failure will result from corrosion, fatigue, abrasive wear, excessive stress, or a combination of these, depending on the rope service conditions. Rope service conditions are determined by the design of the rope handling equipment, its frequency of use, and the environment to which it is exposed. These vary considerably at Corps installations.

Where other wire rope manuals are more general, this manual covers these conditions and attempts to present the latest state-of-the-art technology from commercial and industrial sources, and experience gained at existing Corps projects.

SOLUTIONS The manual is intended to narrow the choices of wire rope to the types suitable for gate lifting devices. Investigation into the manual combined with experience at similar installations, or experience gained from examination of the rope being replaced, should further narrow the choices for the new or replacement rope. Note that final selection should only be made after consultations with manufacturers' application engineers.

The manual also covers maintenance to extend the life of wire rope, and inspection to determine when retirement is required. In addition, it offers ideas to solve problems such as replacing plain bearing sheaves with roller bearing sheaves to reduce loading of ropes, and fabricating two-piece ropes for the different conditions at the different ends of the rope.

CONTENTS OF MANUAL The manual includes numerous figures, charts, and tables. Many of these are from the Wire Rope Users Manual, courtesy of the Wire Rope Technical Board. Others are more directly related to gate operating devices. A brief description of the contents of the manual follows:

Chapter 1 An introduction.

Chapter 2 Wire rope construction and materials including classes, lay, special shapes and strands, wire materials, core construction, coating, filling, plating, and manufacturing techniques.

Chapter 3 Sockets and end terminations including materials, coatings, cutting, seizing, and splicing.

Chapter 4 Optimum design for wire rope selection including load calculations, nominal strengths, factors-of-safety, stretch, bending radii, bearing pressure, and fleet angle.

Chapter 5 Specifying wire rope, including standard nomenclature, special requirements, availability, and relative costs.

Chapter 6 Field acceptance and installation, including storage and handling.

Chapter 7 Inspection, maintenance, and retirement.

Appendix A Nominal strengths and test procedures.

Appendix B Socket efficiencies, test links and tension limiting devices, and rope tensioning equipment and techniques.

Appendix C Kevlar wire rope

Appendix D Inspection, lubrication, and icing.

Appendix E Sample problem.

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